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Small business dilemma

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THE SMALL BUSINESS DILEMMA

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Acknowledgment

To my wife Ann, for her love, encouragement, and patience, I do hereby dedicate this work.

SECTION I

INTRODUCTION

There are many areas in the marketplace today that would be good candidates for ambitious entrepreneurs. Many small businesses are developed because someone saw a niche in the industry that wasn't being fully exploited. This type of a niche is exactly what the researcher was trying to uncover.

The opportunity to begin a small business in the area of engineering consulting was investigated. In general terms there are plenty of engineering contractors, but the segment of the market investigated was that of software development in the area of low volume, application specific software. This type of software falls into the category of prepackaged software as it is written, tested, and installed by a company other than the end-user company. The main objective of this firm would be the development of software for programmable logic controllers (PLC's), but other avenues of technology- based software would also be considered.

Many specialized areas need to be addressed to fully service customers requiring the use of a programmable controller to fulfill the requirements of their

application. This would include among others, development of software (ladder language) to drive the process, support and revision of this software, and consultation on what components would make up the customers optimum system. A system as used in this context would be any process a customer would choose to automate. An example of a simple system would be that of a car wash. A customer would solicit from the proposed business that his or her current car wash facility be totally automated and that by doing so the number of employees necessary to wash a car be cut from 5 to 1. In the proposed business, knowledge of the car wash industry would not be necessary. All the researcher would have to be given is the number of inputs, the type of inputs (some type of ac or dc current), and a process overview. This overview would include timers (i.e., how long the rinse cycle should be) and counters (i.e., how many liters of liquid wax should be used per car). Once again, knowledge of the mechanics of the car wash process is not vital, it is only knowledge of the required inputs to the programmable controller and the corresponding outputs the programmable controller will have to generate to drive the system that is important. Other simple processes would include a cookie factory, or an amusement park, while more sophisticated processes would include simulators and computer-integrated manufacturing.

A short analysis of why a company would choose to purchase prepackaged software over developing it inhouse can

be summarized by looking at the disadvantages of inhouse software compared to the advantages of prepackaged software (Automation, September 1989).

Disadvantages of Inhouse Software
1. Cost may be astronomical
2. Inhouse systems tend to reinforce bad systems practices or merely speed up inefficiencies. Programmers often try to automate a present operation, rather than seek innovative solutions to manufacturing problems.
3. If the project has major problems, if it fails or deadlines are not met, replacing personnel may be a difficult task with serious ramifications. New personnel will have to become familiar with work done by the last programmer, often at the expense of the deadline.
4. Often programmers will not keep documentation up to date due to time limits. This will make upgrades and the deciphering of bugs much more costly.

Advantages of Prepackaged Software
1. A prepackaged software system can take less than a month to install and be ready to use, thereby allowing for a faster return on investment.
2. Prepackaged software has been field tested by professional programmers who know the application for which they are writing very well.
3. Due to the fact that prepackaged software is written by professionals, a great deal of forethought has gone into the software to make it upwardly compatible with future needs.

The researcher is currently employed as a software design engineer for a leading manufacturer of small logic controllers and is quite familiar with both the internal architecture of these devices as well as the programming software and devices necessary to facilitate the implementation of a complete process.

SECTION II

DESCRIPTION OF INDUSTRIES' CURRENT SITUATION

The prospect of beginning a new business must begin with an attempt to try and justify the new business (Baumback, 1988). The place to start is at the market level. A solid marketing analysis is crucial, and the effects of poorly done or misleading marketing analysis results will inevitably show up on the bottom line.

In light of the fact that this business is going to expect to generate the bulk of its business from the development of small programmable controller software and support, an analysis was first conducted to discern whether or not industry experts felt there would be an increase in the number of programmable controllers in the market (Automation April 1990). According to a report from Venture Development Corp., a consulting firm from Natick, Massachusetts, shipments of PLCs with more than 1024 I/O (Input/Output) points are expected to grow at only 3.7% per year in dollars, and 2.7% per year in units from 1989 through 1993. Although these growth figures appear bleak, all news is not bad. Industry analysts expect great growth patterns for the small programmable logic controllers. Experts predict overall unit growth for the smaller PLCs to exceed 11.1% per year over the next 5 years. A recent survey by AUTOMATION readers revealed that 68% of its

readers now use PLCs, while 38.8% plan to buy more in the next 12 months. Reliance is placed on these figures because they indicate the market need for businesses such as the one proposed, to program these controllers as they infiltrate the marketplace. These figures represent new business for the marketplace and, as such, great effort will be made to obtain this business.

The PLCs with 64 I/O or less are going to experience the greatest and fastest growth. They are expected to grow at a rate of 12.7% per year in dollars (from about $308 million in 1989 to nearly $560 million in 1994) and 14.4% a year in units. Automation attributes this growth to the changing buyer profile of PLC users. Typically, there are two types of buyers for programmable logic controllers, original equipment manufacturers (OEMs) and end-users. With the trend towards the smaller PLC due to its modularity, more OEMs see this as an opportunity to introduce the SLC (small logic controller) to markets not yet infiltrated (discrete applications in process control, such as packaging, material handling, batching, mixing, and baking). OEM purchases exceeded 56% of sales in 1988, and by 1993 their purchases are forecast to be nearly 67% of total sales (Automation September 1990).

Once determining that the usage outlook for SLCs looked favorable, a nationwide and then a local search was undertaken to see how many companies of this type existed, and then, the number of businesses of each particular size

that existed. Using the Standard Industrial Classification or SIC number of 7372 (prepackaged software companies) the following statistics were collected (DUN's 1990).

Table 1

Number of Prepackaged Software Companies USA 1989

(listed by number of employees)

1-4	5-9	10-14	15-19	20-49	50-99	100+	(employees)
9064	2221	893	461	958	326	354	(sellers)

Table 2

Number of Prepackaged Software Companies USA 1989

(listed by net sales in dollars)

1-49k	50k-99k	100k-249k	250k-499k	(Annual Sales Volume)
322	945	6893	1407	(Number of Sellers)

500k-999k	1.0M-4.9M	5.0M-over	total	(Annual Sales Volume)
1236	1666	602	13071	(Number of Sellers)

Gathering data for the Milwaukee area involved consulting the COUNTY BUSINESS PATTERNS - WISCONSIN.

Table 3

Number of Prepackaged Software Companies by employment-size

Milwaukee, Wisconsin

1-4	5-9	10-14	15-19	20-49	50-99	100+	(employees)
23	4	6	1	3	-	-	(sellers)

The total number of businesses with the SIC code of 7372 operating out of Wisconsin in 1990 was 163 (DUN's 1990). The number of businesses operating in Illinois was 606.

With the state of the SLC market looking quite favorably, and the number of businesses in the market not seeming too overwhelming, the projected annual growth rate for the industry was investigated. According to Predicasts, in quantities of millions of sales dollars, the following forecast was generated.

Table 4

Growth Rate Predictions for PrePackaged Software Companies

YEARS

B	S	L
90	91	93
1654.7	2153.7	3484.4

Where B = Base Year
S = Short Term
L = Long Term

This forecast predicts an annual growth rate through 1993 of 28.2%.

Painting still a rosier picture, Earl Chafin in his article, "Software Forecast - High Growth in The 1990's" (AUTOMATION September 1990), argues that "while the market for industrial computers is growing at an annual rate of 40 to 50%, the market for industrial software is growing at an astounding rate of 200 to 300% annually."

With the predicted growth rate and the data on the increased number of SLCs that will be inundating the market in the next 3 years, a venture such as the one proposed appears plausible.

SECTION III

IDENTIFICATION OF THE PROBLEM

In this case study, the problem that the researcher is trying to resolve is whether the opening of a new small business that offers software programming services should be attempted. The researcher must decide, based on this study, whether or not the current market is in such a state that it could support the insertion of another high technology, engineering consulting business. This business venture is not unique to the current marketplace, and as such must be investigated in terms of the saturation level of the relevant industry. The researcher, by thorough analysis, must discern not only whether the proposed business could survive in the marketplace, but more importantly whether or not it would be profitable.

SECTION IV

ANALYSIS OF THE PROBLEM

The researcher will attempt to discern, based on the outcome of this analysis, whether or not a new engineering consulting business would be profitable given the current market indicators as well as the short and long range market indicators. This analysis will basically entail setting up a business plan that will accommodate the venture that the researcher has chosen.

Legal Form of the Business

The researcher has as a luxury, a willing and able partner to go into business with. This partner has been a friend of 8 years, has a nearly identical technical background and is on the same economic plane as the researcher. Though both 'partners' have had experience in the same field, the experience has been in entirely different applications. This increases the number of contacts within the industry.

Much thought has gone into trying to determine what type of legal form the new business should choose. Instinctively, this looks like an ideal setting for a general partnership, but given the nature of the business and the potentially disastrous outcome of an incorrectly

designed software system, the researcher felt that the risk was far too great to allow the business to take on unlimited liability in the case of a lawsuit. The next logical step was to investigate options that would restrict the legal liability of the owners for suits for personal injury or other activities connected with operating the business to the amount of funds invested in the business. The limited liability of owners and stockholders would also make investment in the business easier to obtain should the need arise. The legal form of business the researcher has chosen is that of the Subchapter S Corporation. The Subchapter S Corporation has the limited legal liability sought by the researcher as well as the benefit of avoiding being taxed as a legal entity and again as a shareholder. The election of Subchapter S status requires that 9 strict criteria be met. The monitoring of these criteria would be handled by the legal services solicited by the proposed business.

Market Feasibility

Much of the marketing feasibility study has been discussed in the Section II on the description of the current industry position. Industry sales trends (Predicasts, 1990) are expected to grow by an annual rate of 28.2% over the next 3 years in the area of prepackaged software. Also noteworthy is the fact that (Automation, April 1990) the increase in the demand of the small

programmable controller is expected to grow at a rate of 12.7% annual dollar growth and 14.4% annual unit growth. Based on current trends the increase in the number of programmable controllers means that more system design work will be available.

Statistics aside, the researcher having worked in the programmable controller business for numerous years, will draw upon that experience for added assurance of the business' potential for profitability. Frequently, the researcher in day to day business is required to solicit the services of a business similar to the one proposed. This solicitation is performed for the service of new application start up. In retrospect, quality businesses that performed this service were difficult to find. The businesses that performed quality work were at full employment and, to a great extent, could determine their price for the job.

A thorough market feasibility study also requires that one decide and define what is the makeup of one's customer. Customers who would solicit the services of the researcher's proposed business are first and foremost those businesses that set up smaller companies with process automation equipment. In essence, these companies are contracting out a great deal of the work either because of a lack of expertise in this particular area, or simply because there is an overload of work and it may not be cost effective to employ an additional engineer on a full-time basis. Another potential customer would be a large company that produces

the programmable controllers. They would have a need to contract out some of the nonspecific jobs on their programmable controllers (e.g., an interface between their programmable controller and a third party peripheral). Still another potential customer would be subscribers to technical journals or trade show enthusiasts who have a need for custom software and are looking for a software house to develop it.

Finally, after looking at the potential competition in the market, some type of sales projections have to be made. These projections should be made for the first 3 years (Baumback, 1988). The business the researcher is considering starting will fall into the category range (at least initially) of one to four employees, and to get projections the industry statistics as well as statistics for businesses of similar size and type are used. The current going wage of a consulting engineer is between $37 and $46 per hour (Appendix B). Given that figure which averages to $41.50 an hour and the fact that this business would not be established within the industry for at least a year or two, values of $38.00, $40.00, and $43.00 an hour will be used for engineer hours in projecting sales dollars, although the engineer will receive in salary about half of that amount. The researcher would also employ the services of a PLC technical specialist. This individual would be paid $12.00 an hour and the customer would be billed $26.00 an hour to acquire the services of this

employee. The net sales for the first year take into account that the business may not generate sales for the first 4 to 6 weeks. This time would be spent preparing for trade shows and compiling advertising campaigns. In subsequent years the same advertising effort will not require as much preparation, as much of the initial work can be used from the initial campaign. Based on this premise the projected sales figures are calculated using 1,488 billable hours (248-6 hour days) per employee in the first year, and 1620 billable hours (270-6 hour days) in the following two years. Sales projections are tabulated in Appendix A, and again in the income statement in Appendix D.

Advertising and Sales Promotion

Promotion for a new business may very possibly determine whether or not the business is to succeed (Baumback, 1988). Advertising in the case of the researcher's business is certainly necessary, the only real question to answer is what type of advertising media and promotional methods will be utilized.

The researcher has decided on three different types of advertising media. First, advertising will take the form of telephone book advertising; the cost of this advertising is $18.50 (Wisconsin Bell Yellow Pages) per month for the typeset chosen by the researcher. Secondly, advertisements in the weekly periodical Electronic Engineering Times will

be scheduled at a rate of $156 per column inch. This magazine is free to anyone with a technical or management background and has a circulation of over 125,000. Another periodical, Automation, is considered by many the source for programmable controller news and will also be an advertising source. This type of advertisement is in the form of an "Action Card" which is a self addressed perforated card that the reader completes to request more information on a particular article or insertion. The rate per insertion is $745 for a 4 inch column, and the periodical has a circulation of 91,100. These "Action Cards" will inform readers of some of the new technological innovations the business has perfected and how the customer's business could benefit from this technology.

The final method of advertising the researcher will use is the exposure obtained from taking part in trade shows. Attendance and active participation in two trade shows will be used as part of the advertising campaign. The first show which is in the Spring of every year is the IPC or Industrial Programmable Controllers show. This is the largest show of its kind, and the majority of the competition will be in attendance. The second show, the Instrument Society of America (ISA) trade show, takes place in the Fall of each year, and to get the recognition of the industry, attendance and booth rental are imperative. The cost of renting a booth at each show is $1,500 for a 100 sq ft space. This space will be quite adequate for a business

such as the one described. These shows are necessary to show potential customers not only who you are, but what it is that you have to offer in the line of new technology and software.

Perhaps the most important method of promotion will be from the contacts the partners have made in the industry over the past 5 years or so. Knowing which companies to solicit as well as to whom to speak must certainly be considered an asset when trying to promote sales. These contacts come in the form of both sales and procurement. The researcher, having five years of experience in the industry with a leading manufacturer of programmable controllers, will be able to expedite certain processes thereby allowing the business to aggressively bid on attractive projects. This intangible asset could take many forms. From obtaining hard to locate I/O cards to getting the most current releases of programming software. Another type of asset the researcher brings to the business is the number of contacts established with software companies that work for the researcher's current employer. The researcher has visited these software companies when working with them on specific projects. Knowing the key personnel in these companies and knowing that they too solicit other software companies to manage their overload will be most beneficial in acquiring additional work. The partner's contacts will be used to directly generate sales. Having worked for a small engineering firm in the past, the partner has compiled

many application specific contacts. These contacts will be used to generate sales in specific areas. Some examples include infiltrating the waste water treatment market, or the amusement park market. Knowing who these people are is a plus, having a working relationship with them is most advantageous.

Physical Facilities

Site selection is important to this business. Although many sites were considered, the availability at the time of this paper of a site in Brookfield Wisconsin will be used for analysis sake. This site has three offices, 192 sq ft, 181 sq ft, and 179 sq ft, is located right off I-94, has secretarial services and utilities included for a price of $841.00 monthly.

As the researcher is considering a business with three employees this is an ideal site. The accessibility of this building with the I-94 interstate will be crucial to both customers and the staff. Customers will want a location that is easily accessed, and consideration has to be made with respect to distance from the airport. Frequently, customer site visits will be necessary and easy access to a major interstate is certainly a plus.

This office space is shared with other professional businesses and is near capacity. There is not much room for expansion, so this will have to be taken into consideration

should the occasion arise. The monthly price for the office space includes all utilities except the telephone. One of the big advantages is the receptionist for the building that is included in the monthly fee. Calls can be answered in a professional manner without the need to hire a personal receptionist. There is ample parking and a sign with the companies name and location will be located near the receptionist. The equipment and fixtures requirements are tabulated in Appendix C. This figure comes to just under $10,000 for startup. As both partners are engineers with considerable experience, there is a great deal of replacement and overlap due to the accumulation of computer related equipment over the years by the partners.

Suppliers to the Business

Sources of suppliers and negotiating terms need to fully examined, and some level of confidence must be established by the researcher such that procurement of necessary equipment will not impede software production. There are two areas of concern to address. This business cannot function without computer equipment or programmable logic controller equipment. The computer equipment must be reliable and state of the art with respect to the operating system that the programming software runs on. With the thought of obsolescence and the requirement of near zero down-time for the computers, the analysis of a buy versus a

lease of the equipment was undertaken (Appendix E). Based on the present value of the cost of leasing versus buying, the superior choice to be made was for leasing. This is also beneficial in that upkeep and service on the machines is included in the terms of the lease and, if desired, the machines can be purchased at the end of the lease for an additional ten percent of the base price of the merchandise.

The programmable controller equipment must also be state of the art and, as such, special purchasing agreements can be made with the a leading supplier of programmable controllers in the Milwaukee area to obtain any updates or revisions of current software, provided they are consistent with the hardware platform initially purchased. This programmable controller manufacturer also has a support line and an application engineering hotline should any customers discover bugs or other problems with their controllers. As this equipment is not able to be leased, these figures were not calculated.

Personnel

As was previously discussed, the business will consist of three employees. The 'partner' in the business, a technician that will have to be hired, and the researcher. The hiring of the technician will be done through an advertisement in the local newspaper. The cost of the advertisement will be $55, and this will be run in the

weekend paper. The salary for this individual will be $21,500 annually and will include one week of vacation after one full year of service. Health and dental insurance will be paid by the employee. The researcher having worked in the industry for a number of years believes the value of this offer to be competitive with similar offers in the industry.

Administrative Organization

Since the researcher has a degree in business administration and engineering, the management related tasks will be performed by him, while the majority of the technical and contractual related tasks will be performed by the 'partner' with assistance from the technician (see Appendix F). The projected wage and salary costs for the following three years are: $112,320, $117,936, $123,833, for years one, two and three respectively (see Appendix G). Relevant taxes are addressed in Appendix I, while taxes for billing and order taking are considered virtually a non-factor due to the small number of accounts per year. All of these costs are fixed, and as such will not fluctuate from month to month. No employee benefit plans are contemplated in the near term.

Producing the Service or Product

The actual product that will be produced will be sold or transported either on a diskette medium or on a programmable integrated circuit. In the case of this business, most of the work will be 'burned' into programmable read only memory chips.

The main point of this section is that the crucial element to this company's success may very well lie in its ability to meet deadlines and give accurate estimates of time to market. For this reason, software packages that have to deal with scheduling and control will be purchased. The business has the luxury of having the 'partner' experienced in scheduling software projects. Two software packages will be used to schedule software tasks. The first such package is called PROMISE and sets up critical paths and duration of tasks, while the second package GNATT will actually tabulate resource availability and integrate those findings with the PROMISE package.

Initial Capital Requirements

The costs of both initial and perpetual capital must be considered, along with ways to finance the needed capital (debt or equity capital). Nonrecurrent costs of setting up the business will be estimated first. These are costs that would have to be met before the first sale is made. These

costs are itemized in Appendix H. The total of these costs along with a reserve for contingencies is $20,363. Once these costs were totaled, an estimate of the cash operating expenses for the first year (Appendix I) was tabulated. These costs are derived from the pro forma income statement in Appendix D, and total to $173,776. Combining the startup costs and one third of the first year anticipated cash outlays (worst case scenario is that business will not be generating sales effectively at inception), the initial capital requirements for the startup of this business are approximately $78,471. Of the total estimated amount of capital necessary to begin business operations, the researcher and the partner will contribute equity shares of $10,000 each. A 5-year bank loan of $60,000, guaranteed by the partners and collateralized by their personal net worth, with an annual interest rate of 15%, will provide the remaining $58,471. The amortization schedule for the loan appears in Appendix O.

Risk Evaluation

Risk evaluation in this context will have two separate and distinct connotations. Risk with respect to the potential for underbidding a project will be considered initially, and risk which involves insurance matters will be addressed thereafter.

The business the researcher is proposing will require that projects and jobs be bid upon. By the nature of this business the jobs that will be bid upon will range anywhere from one month to several months. The possibility that two jobs may be worked on simultaneously is very real, therefore, much forethought will be needed to avoid scheduling conflicts and over-runs. Having had the luxury of the partner bringing to the business proven bidding strategy and negotiation skills cannot fully guarantee that a job will either be under bid or fall behind schedule. Herein lies the biggest risk in the proposed business. Having a job underbid or late could jeopardize the business, and overbidding or asking for too much time could ultimately achieve the same result. Given that the researcher will bring skills to the negotiating process coupled with the partners expertise, a certain confidence factor exists. If by chance a project does get into trouble it will be up to the partners to expedite the process by their own time and effort or the technician will have to be paid overtime to see the project through to completion. If this scenario does develop frequently, there is serious doubt in the mind of the researcher that the business would survive. Given that possible outcome, the researcher has done a thorough job of analyzing the partners' skills and experience in this area, and feels confident enough in these skills to collateralize this business through personal net worth.

In order to try and obtain insurance for the proposed business, the researcher had to consider getting an insurance company to underwrite the standard office insurance (insurance from theft, fire, and accident), but more importantly, the product liability insurance needs will have to met. A table (Appendix J) was developed in conjunction with a national insurance company evaluating insurance loss exposure as critical, important, or unimportant. Critical risks are those involving possible losses that could result in bankruptcy of the new business, these risks must be covered by the policy. Important risks are those involving possible losses that would require the firm to borrow to continue operations, insurance companies strongly recommend that these risks be covered to the degree affordable. And finally, the unimportant risks are those involving losses that would not require the firm to borrow but that could be met out of existing assets without putting a strain on finances of the firm and could be treated as typical operating expenses, this type of coverage is necessary only if the terms are quite agreeable. Upon completion of this loss exposure checklist and the discussion with the insurance agent the insurance estimate for business liability and personal property and equipment came to $820 annually, while the insurance for product liability (Error and Omissions Policy Products/Completed Operations) came to $2,500. These quotes appear in Appendix L. After consultation with the insurance agency

and their legal counsel, the researcher was advised to obtain a "buy/sell" life insurance policy on both partners. This policy would yield $100,000 to the business (which is the beneficiary) in the event of one of the partners death. This policy will allow the business to financially withstand a devastating blow such as the one described. The cost of this policy will be $17 per month for each of the partners. Finally, workers compensation must be taken out on the technician, (and will be considered for the partners in the following years) and this policy was quoted at $354 annually. All of the above quotes were obtained through interviews with the American Family Insurance Company.

Financial Statements and Accounting

The two primary objectives of this business will be solvency and profitability. To begin the analysis of the financial statements, the issue of solvency will be addressed. Solvency within a company is reflected in its balance sheet. The researcher has prepared an opening balance sheet for the proposed business. This balance sheet is based on the estimate of initial capital requirements as outlined in Appendix H, and the financial planning as described in the initial capital requirements section of this document. The balance sheet for the first day of business is projected in Appendix K. In analyzing the balance sheet, certain ratios can be determined and compared

both against the benchmark ratios for businesses in general and against those businesses that compete in similar industries. The most commonly used measure of a businesses liquidity is the current ratio, which is the ratio between current assets and current liabilities. This analysis and other ratios will better reflect the projected state of the business when the pro forma balance sheets are derived in Appendix M. As balance sheets represent only a snapshot in time of the state of a business, this exercise will be most beneficial in determining how the proposed business compares to that of similar businesses within the same industry. These findings are tabulated in Appendix O.

As can be seen by these ratios, the proposed business is in a very good position, but the main reason for the high values of assets over liabilities is due to the conservative approach the researcher took in regard to obtaining the $60,000 loan. A loan of this amount was sought to assure the researcher that in the event that profit wasn't seen in the calculated time frame, the payroll and thus the solvency of the business could still be obtained. The researcher is taking a worst case scenario approach because it is genuinely believed that in time, the accounts will be in place to realize an adequate profit.

SECTION V

DESCRIPTION OF POTENTIAL SOLUTIONS

This case has three reasonable solutions: the researcher could choose to do nothing; wait until market indicators change and proceed with the business venture; or put the plan into action at this time.

The do nothing scenario is an undesirable alternative because at this point in time the researcher and the partner are somewhat dissatisfied with their current positions, and an opportunity such as the one proposed would enable both job satisfaction and an increase rate of return for services rendered.

The second scenario, waiting until the market indicators change, is an undesirable alternative because these market indicators could more easily get worse than better. The market is currently quite attractive for a business venture such as the one proposed, and to wait for the market to become even better is a gamble, one the researcher doesn't advise. Not only could waiting tilt the market against this business, but waiting could also affect the cash flow of the two partners when the initial investment is made in the business.

Proceeding with the business venture, the third scenario, is the choice the researcher feels that this

analysis leads to. The justification for this choice follows in the next section.

SECTION VI

RESOLUTION

With the thorough analysis performed on the decision as to whether or not this business venture would be profitable, and therefore worth the risk, the researcher feels confident in this study to pursue the proposition of initiating this small business. The most staggering piece of information uncovered here is that the researcher could maintain his current salary base, work on that aspect of engineering that he truly enjoys and begin to show a significant profit in the second year of operation. The ratio analysis performed yielded figures that would encourage the introduction of the proposed business into the marketplace. A small loss in the first year of operation is projected, while modest profits are realized in only the second year with the third showing still greater profits. The only real drawback is that the company is heavily leveraged initially, however, this might change if the business were to become even slightly profitable early on. As the analysis shows, this would indeed be a prudent business venture.

REFERENCES

Baumback, M. (1988). How to organize and operate a small business (3rd ed.). Homewood, IL: Irwin.

Chefin, E. (1990, April). Move Over Large PLCs, Small PLCs Are Taking Over. Automation, pp. 36-42.

Cohen, A. (1990). The entrepreneur and small business problem solver (2nd ed.). New York, NY: Wiley

Crumbley, W., & Davis, T. (1984). Operating and terminating subchapter S corporations, (pp. 12-13). Tucson, AZ: Lawyers and Judges Publication Company.

Directory of Conventions (1990). New York, NY: Successful Meetings Data Bank.

Hermanson, H. (1987). Financial accounting (3rd ed.). Homewood IL: Bpi & Irwin.

Jaseny, C. (September 1989). *Software* Forecast-High Growth In The 1990's. AUTOMATION, PP. 20-23.

Kempin, F. G., & Wiesen, J. (1983). Legal aspects of the management process (3rd ed.). New York: West Publishing.

Needles, B., Jr. (1989). Financial accounting. Boston, MA: Houghton Mifflin Company.

Standard Periodicals Directory (1990). New York, NY: Oxbridge Publishing Company.

Predicasts (1990). Cleveland, OH: Predicasts Incorporated.

Tate, A. & Megginson, T. (1985). The complete guide to running your own business., Homewood IL: Dow Jones-Irwin.

Trade Shows World Wide (1990). Detroit, MI: Gale Research Incorporated.

Weston, J., & Copeland, E. (1987). Managerial finance (8th edition with tax update). Orlando FL: Dryden Press.

Appendix A

Sales Projections:

Employment of 248-6 hour days per year 1
Employment of 270-6 hour days per year 2
Employment of 270-6 hour days per year 3

Product or Service	1st Year	2nd Year	3rd Year
Engineering Software Consulting (Resource 1)	$56,544	$63,895	$69,007
Engineering Software Consulting (Resource 2)	56,544	63,895	69,007
PLC Technical Specialist	38,688	43,717	47,214
Total	$151,776	$171,507	$185,228

* Incremental projections include increase based on establishment of business after year 1. These increases are justified and are in line by industry analyst projections. These increases are further justified and anticipated through trade shows, advertisement, and business contact work being seen to fruition. This will yield an 13% increase in year 2, followed by an increase of 8% in year 3. These figures will approach those of the high end leaders in the engineering consulting business as tabulated in Appendix B.

* The billable hours per year are calculated in conjunction with knowledge of hours needed for trade shows, advertisement, and 6 weeks of non-billable time needed to establish business before sales generation.

Appendix B

Survey of Fees Charged by Engineering Consulting Firms

(Based on experienced engineers with not less than 4 years industry experience, and technicians with not less than 4 years experience)

Company	Engineer	Technician
Argus (Milwaukee)	$37.00/hr	$28.00/hr
CDI (Milwaukee)	38.00/hr	24.00/hr
Engineering Placement Specialists	38.00/hr	25.00/hr
FASTEK Technical Services (Milwaukee)	40.00/hr	28.00/hr
PROSTAFF (Milwaukee)	39.00/hr	24.00/hr
Snelling (Milwaukee)	45.00/hr	26.00/hr
TechStaff (Milwaukee)	46.00/hr	30.00/hr
Average	$40.43/hr	$26.43/hr

* Of the companies that responded, over 70% indicated that persons in this line of work were highly sought after.

Appendix C

Fixtures and Equipment

Type of Equipment	Number Needed	Total Cost
Office:		
Desks	2	$ 600
Chairs	3	225
File Cabinet	2	300
Work Bench	1	200
Computer Equipment:		
Computer IBM/AT	2	4000
Printer	2	400
Paper	1	50
Misc Accessories	1	100
Programmable Controller Equipment		
PLC 13 slot rack, Power Supply, CPU, I/O modules AB-1746-A7	1	515
Isolated Link Coupler AB-1747-AIC	2	410
Professional Programming System (all items necessary to successfully program PLCs)	1	2900
Total		$ 9700

Appendix D

Pro-Forma Income Statements

	Year 1	Year 2	Year 3
Net Sales	$151,776	$171,507	$185,228
less Cost of sales	500	550	600
= Gross Margin	$151,276	$170,957	$184,628
EXPENSES			
Variable:			
Employees salaries	112,320	117,936	123,833
Office supplies	500	500	500
Advertising	14,773	10,773	10,773
Legal fees	400	400	400
Unemployment and SS tax	12,896	14,252	15,808
Fixed:			
Rent	10,092	10,092	10,092
Utilities	360	380	400
Insurance	5,074	5,200	5,350
Interest	8,397	7,016	5.391
Total Expenses	$164,812	$166,549	$172,547
Net profit or (loss)	($13,536)	$4,408	$12,081

Cost of goods sold = physical media of software

Employee Salary increase 5% annually

Appendix E

Borrowing to Buy vs. Leasing
(leasing terms from United Leasing Milwaukee)

Equipment	Number	Total Price
IBM AT Computer 1M on board RAM 16 Color VGA Monitor 3.5 Diskette Service 5.25 Floppy Service 52M Hard Drive	2	$ 4000

$$\text{annuity} = \frac{\$4,000}{(\text{PVIFA})(10\%, 3\text{yrs})}$$

$$= \frac{\$4,000}{2.4869} = \$1,608$$

Schedule of Debt Payments

(1)	(2)	(3)	(4)	(5)
1	$4000	$1608	$400	$1208
2	2792	1608	280	1328
3	1464	1608	146	1464
Totals		$4824	$824	$4000

Where (1) : End of Year

(2) : Balance of Principal Owed at End of Year

(3) : Principal plus interest Payments

(4) : Annual Interest [10% x (2)]

(5) : Reduction of Principal

Costs of Borrowing

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	$1608	$400	$1333	$ 693	$ 915	.9434	$ 863
2	1608	280	1333	645	963	.8900	857
3	1608	146	1333	592	1016	.8396	853
Totals	$4824	$826	$4000	$1930	$2894		$2573

Where: (1) End of Year

(2) Loan Payment

(3) Annual Interest

(4) Depreciation (Straight Line)

(5) Tax Shield (Write Offs) [(3)+(4)]0.4(tax rate)

(6) Cash Flows after Taxes (2) - (5)

(7) Present value Factor (at 6%) (Cost of borrowing assumed to be 10%, therefore its after-tax cost with a 40 percent tax rate is 6 percent)

(8) Present Value of Costs

Costs of Leasing

(1)	(2)	(3)	(4)	(5)
1	$1752	$ 701	.9434	$ 661
2	1752	701	.8900	624
3	1752	701	.8396	589
Totals	$5256	$2103		$1874

Where : (1) End of Year

(2) Lease Payments (dictated by Universal Leasing)

(3) After-Tax 0.4 x (2)

(4) Present value factor (at 6%)

(5) Present Value of Costs: (3) x (4)

Appendix F

Administrative Organization

Researcher:	Management, Selling, Promotion, Accounting, Supervise, Finance
Partner:	Engineering, Liaison, Supervise Technician, Scheduling, Clerical
Technician:	Field Service, Programming, Debugging, Trouble Shooting, Installation

Appendix G

Projected Wage and Salary Costs

	First Year	Second Year	Third Year
Researcher	$ 45,410	$ 47,681	$ 50,065
Partner	45,410	47,680	50,065
Technician	21,500	22,575	27,703
Totals	$112,320	$117,936	$123,833

Appendix H

Initial Capital Requirements

Furniture, fixtures, and equipment	$ 9,700
Advertising expenses	
AUTOMATION	
EE TIMES (4 lines x $156)	
Bell	
Total advertising	1,393
Classified advertising	55
Legal fees	300
Prepaid operating expenses	
One month's advance rent	841
Annual insurance premium	
Errors and Omissions + Buy/	
Sell Life on partners	4,720
Workers Compensation (Technician)	354
Minimum reserve balance (for contingencies)	3,000
	$20,363

Appendix I

Projected Operating Expenses Year 1

Employees' wages and salaries	$ 76,960
Researcher's salary	52,000
Taxes	
FICA	9,685
FUTA (federal and state)	7,996
State Income (profits)	0
Rent	10,092
Office Supplies	500
Advertising	14,773
Legal Fees	400
Telephone	360
Miscellaneous	1,000
Total	$173,776

Appendix J

Loss Exposure Checklist

Critical	Important	Unimportant	
			Liability arising out of:
	X		Workers' compensation
	X		Premises and operations
X			End products
	X		Damage to property
		X	Damage to rented premises
	X		Damage to leased Property
			Damage to Equipment caused by:
	X		Fire or lightning
		X	Windstorm, hail, explosion
		X	Vandalism and malicious mischief
		X	Water damage
			Indirect loss resulting from:
		X	Dishonest employees
X			Death or disability of key employees
X			Loss of income during a period of shutdown or business interruption.
X			Additional expenses incurred to continue operations
			Loss resulting from criminal acts of non-employees:
	X		Burglary
	X		Robbery
		X	Forgery

Appendix K

Opening Balance Sheet
X/X/90

Assets		
Current Assets:		
Cash	$62,537	
Prepaid rent	841	
Prepaid insurance	5,074	
Prepaid advertising	1,448	
Office supplies	400	
		$70,300
Fixed Assets:		
Furniture and fixtures	$ 1,325	
Computer equipment	4,550	
PLC equipment	3,825	9,700
Total Assets		$80,000
Liabilities and Net Worth		
Fixed Liabilities:		
Notes Payable		$60,000
Net Worth		20,000
Total Liabilities and Net Worth		$80,000

* 5 year loan shown as cash asset.

AMERICAN FAMILY
INSURANCE
AUTO HOME BUSINESS HEALTH LIFE

October 24, 1990

Kelly Hanaway
N10706 W169 Redwood La
Germantown WI 53022

Dear Mr. Hanaway

The following costs are for the business insurance on the software company that you have asked me to quote on. If you have any questions, please feel free to give me a call at 463-1155.

BUSINESS KEY POLICY
LIABILITY INSURANCE 300,000/600,000
BUSINESS PERSONAL PROPERTY: approx. value at $1500.00
EDP EQUIPMENT: approx. value at $8500.00

APPROXIMENT COST: $820.00/year.

WORKERS COMPENSATION
PARTNERS INCLUDED: $667.00/year
PARTNERS EXCLUDED: $354.00/year

E & O POLICY PRODUCTS/COMPLETED OPERATIONS
$1,000,000 LIABILITY

MINIMUN PREMIUM: $2500.00/year

The cost on the E & O policy is only the minimum. The actual premium is determined by your gross sales which could make the actual premium higher.

Once again, if you have any questions about the quote, please feel free to give me a call at any time.

Thank you for the chance to quote on your business.

Sincerely,

JEFFERY HAAS
AMERICAN FAMILY AGENT

Appendix M

Pro Forma Balance Sheets

	1st Year	2nd Year	3rd Year
Cash	$59,000	$65,000	$70,000
Prepaid rent	841	841	841
Prepaid insurance	5,075	5,075	5,075
Accounts receivable	1,000	2,000	3,000
Total Current Assets	$65,916	$ 72,916	$ 78,916
Furniture	$ 1,325	$ 1,200	$ 1,050
Computer equipment	4,550	3,500	2,500
PLC equipment	3,825	3,450	3,200
Total Fixed Assets	$ 9,700	$ 8,150	$ 6,750
Total Assets	$75,616	$81,066	$85,666
Taxes withheld from employees	$ 2,837	$ 3,246	$ 3,464
Wages payable	3,274	3,618	4,013
Interest payable (1 month)	706	580	456
Total Current Liabilities	$ 6,817	$ 7,444	$ 7,933
Note payable (5 years)	$55,791	$45,561	$35,516
Net worth	$13,008	$20,617	$34,284
Total Liabilities and Net Worth	$75,616	$81,066	$85,666

Taxes payable assume taxes withheld for one month
Wages payable include 9 working days wages earned by employee but received on 10th day

Appendix N
LOAN SCHEDULE

Principal	$60,000	Total	
Interest	15.00%	Paid	$85,620
Years	5		
Payment	$1,427		

Month	Initial balance	Principal paid	Interest paid	Total paid	Ending balance
1	$60,000	$694	$733	$1,427	$59,306
2	$59,306	$686	$741	$2,854	$58,620
3	$58,620	$694	$733	$4,281	$57,926
4	$57,926	$703	$724	$5,708	$57,223
5	$57,223	$712	$715	$7,135	$56,512
6	$56,512	$721	$706	$8,562	$55,791
7	$55,791	$730	$697	$9,989	$55,061
8	$55,061	$739	$688	$11,416	$54,323
9	$54,323	$748	$679	$12,843	$53,575
10	$53,575	$757	$670	$14,270	$52,817
11	$52,817	$767	$660	$15,697	$52,051
12	$52,051	$776	$651	$17,124	$51,274
13	$51,274	$786	$641	$18,551	$50,488
14	$50,488	$796	$631	$19,978	$49,692
15	$49,692	$806	$621	$21,405	$48,886
16	$48,886	$816	$611	$22,832	$48,070
17	$48,070	$826	$601	$24,259	$47,244
18	$47,244	$836	$591	$25,686	$46,408
19	$46,408	$847	$580	$27,113	$45,561
20	$45,561	$857	$570	$28,540	$44,704
21	$44,704	$868	$559	$29,967	$43,835
22	$43,835	$879	$548	$31,394	$42,956
23	$42,956	$890	$537	$32,821	$42,066
24	$42,066	$901	$526	$34,248	$41,165
25	$41,165	$912	$515	$35,675	$40,253
26	$40,253	$924	$503	$37,102	$39,329
27	$39,329	$935	$492	$38,529	$38,393
28	$38,393	$947	$480	$39,956	$37,446
29	$37,446	$959	$468	$41,383	$36,487
30	$36,487	$971	$456	$42,810	$35,516
31	$35,516	$983	$444	$44,237	$34,533
32	$34,533	$995	$432	$45,664	$33,538
33	$33,538	$1,008	$419	$47,091	$32,530
34	$32,530	$1,020	$407	$48,518	$31,510
35	$31,510	$1,033	$394	$49,945	$30,477

36	$30,477	$1,046	$381	$51,372	$29,431
37	$29,431	$1,059	$368	$52,799	$28,372
38	$28,372	$1,072	$355	$54,226	$27,299
39	$27,299	$1,086	$341	$55,653	$26,214
40	$26,214	$1,099	$328	$57,080	$25,114
41	$25,114	$1,113	$314	$58,507	$24,001
42	$24,001	$1,127	$300	$59,934	$22,874
43	$22,874	$1,141	$286	$61,361	$21,733
44	$21,733	$1,155	$272	$62,788	$20,578
45	$20,578	$1,170	$257	$64,215	$19,408
46	$19,408	$1,184	$243	$65,642	$18,224
47	$18,224	$1,199	$228	$67,069	$17,024
48	$17,024	$1,214	$213	$68,496	$15,810
49	$15,810	$1,229	$198	$69,923	$14,581
50	$14,581	$1,245	$182	$71,350	$13,336
51	$13,336	$1,260	$167	$72,777	$12,076
52	$12,076	$1,276	$151	$74,204	$10,800
53	$10,800	$1,292	$135	$75,631	$9,508
54	$9,508	$1,308	$119	$77,058	$8,200
55	$8,200	$1,325	$102	$78,485	$6,875
56	$6,875	$1,341	$86	$79,912	$5,534
57	$5,534	$1,358	$69	$81,339	$4,176
58	$4,176	$1,375	$52	$82,766	$2,801
59	$2,801	$1,392	$35	$84,193	$1,409
60	$1,409	$1,409	$18	$85,620	$0

Appendix O

Projected Financial Ratios

RATIO	Industry Median	1st Year	2nd Year	3rd Year
CURRENT	1.7	9.6	10.9	10.8
QUICK	1.7	9.6	10.9	10.8
CURRENT ASSETS/ TOTAL ASSETS	74.6%	87.1%	89.2%	92.2%

** Industry figures obtained from **Financial Research Associates 1989** for: Professional Engineering Services with total assets $50,000 - $75,000 **